CLAIMS

What is claimed is:

1. An optical connection module for attaching an optical component to a substrate and aligning said optical component with a first laser, comprising:

a substrate;

a fiber submount that is attached to said substrate and that includes a thermally insulating material having a thickness greater than 20 micrometers;

an optical component that is soldered to said fiber submount using heat from a second laser;

a laser submount attached to said substrate; and

a laser that is attached to said laser submount.

2. The optical connection module of claim 1 wherein said optical connection module is a fiber-coupled laser module and said optical component is an optical fiber.

3. The optical connection module of claim 1 further comprising a fiber bonding pad located between said thermally insulating material and said optical component.

4. The optical connection module of claim 1 wherein said fiber bonding pad and said thermally insulating material conduct heat locally during soldering to uniformly melt said solder.

5. The optical connection module of claim 3 wherein said thermally insulating material and said fiber bonding pad limit heat transfer to said substrate during soldering.

6. The optical connection module of claim 3 wherein said fiber bonding pad performs at least one of providing a solder dam, absorbing laser light, laterally conducting heat, and improving the strength of an attachment between said optical component and said substrate.

7. The optical connection module of claim 6 wherein said fiber bonding pad includes:

a first layer; and

a second layer having one side connected to said first layer.

8. The laser module of claim 7 wherein said fiber bonding pad further includes a third layer having one side adjacent to said second layer.

9. The laser module of claim 7 wherein said first layer is made of Au.

Sub A2

10. The laser module of claim 7 wherein said second layer is a material that absorbs laser light.

11. The optical connection module of claim 7 wherein said second layer acts as a solder dam.

12. The optical connection module of claim 7 wherein said second layer is selected from the group of Ni, Cr, Ti and CrO.

13. The optical connection module of claim 8 wherein said third layer is made of Ti.

14. The optical connection module of claim 8 further comprising a fourth layer located between said second and third layers.

15. The optical connection module of claim 14 wherein said fourth layer is made of Pt.

16. The optical connection module of claim 1 wherein said thermally insulating material is selected from the group of glass and ceramic.

17. The optical connection module of claim 1 wherein said solder is selected from the group of AuSn, PbSn and AuGe.

Sub A2

18. The optical connection module of claim 1 wherein said laser submount is selected from the group of AlN, AlNi, SiC, BeO, TcBN, diamond and Si.

19. The optical connection module of claim 18 wherein said optical component is an active optical component.

20. The optical connection module of claim 19 wherein said optical component is a passive optical component.

21. The optical connection module of claim 1 wherein said optical component is selected from the group of optical fiber, mirrors, lenses, detectors, microelectromechanical (MEMS) devices, and isolators.

22. A optical connection module for attaching an optical component to a substrate and for aligning said optical component to a first laser, comprising:

a substrate;

a fiber submount attached to said substrate and including a fiber bonding pad and a thermally insulating material that has a thickness greater than 20 micrometers and wherein said fiber submount conducts heat locally during soldering to uniformly melt said solder and insulates heat transfer to said substrate;

an optical component that is soldered to said fiber bonding pad with heat that is produced by a second laser;

a laser submount that is attached to said substrate; and

a laser that is attached to said laser submount.

23. The optical connection module of claim 22 wherein said fiber bonding pad performs at least one of providing a solder dam, absorbing laser light, laterally conducting heat, and improving the strength an attachment between said optical component and said substrate.

24. The optical connection module of claim 23 wherein said fiber bonding pad includes:

a first layer; and

a second layer having one side connected to said first layer.

Sub A2

25. The optical connection module of claim 24 wherein said fiber bonding pad includes a third layer having one side adjacent to said second layer.

26. The optical connection module of claim 24 wherein said first layer is made of Au.

27. The optical connection module of claim 24 wherein said second layer is a material that absorbs laser light.

28. The optical connection module of claim 24 wherein said second layer acts as a solder dam.

29. The optical connection module of claim 24 wherein said second layer is selected from the group of Ni, Cr, Ti and CrO.

30. The optical connection module of claim 25 wherein said third layer is made of Ti.

31. The optical connection module of claim 25 further comprising a fourth layer located between said second and third layers.

32. The optical connection module of claim 31 wherein said fourth layer is made of Pt.

Sub A2

33. The optical connection module of claim 22 wherein said solder is selected from the group of AuSn, PbSn, and AuGe.

34. The optical connection module of claim 22 wherein said laser submount is selected from the group of AlN, AlNi. SiC, TcBN, BeO, diamond and Si.

35. The optical connection module of claim 22 wherein said optical component is at least one of active and passive optical components.

36. The optical connection module of claim 22 wherein said optical component is selected from the group of optical fiber, mirrors, lenses, detectors, microelectromechanical devices, and isolators.

Sub A2

37. An integrated optical connection module for attaching an optical component to a substrate and for aligning said optical component to a first laser, comprising:

a substrate;

a thermally insulating material formed integrally in said substrate and having a thickness greater than 20 micrometers;

a fiber bonding pad including at least one metallic layer attached to said thermally insulating material;

an optical component that is soldered to said fiber bonding pad; and

a first laser located on said substrate.

38. The integrated optical connection module of claim 37 wherein said fiber bonding pad conducts heat locally during soldering to uniformly heat said solder using a second laser and insulates heat transfer from said solder to said substrate.

39. The integrated optical connection module of claim 37 wherein said fiber bonding pad performs at least one of providing a solder dam, absorbing laser light, laterally conducting heat, and improving the strength an attachment between said optical component and said substrate.

Sub 12

40. The integrated optical connection module of claim 37 wherein said fiber bonding pad includes:

a first layer; and

a second layer having one side connected to said first layer.

41. The integrated optical connection module of claim 40 wherein said fiber bonding pad includes a third layer having one side adjacent to said second layer.

42. The integrated optical connection module of claim 40 wherein said first layer is made of Au.

43. The integrated optical connection module of claim 40 wherein said second layer is a material that absorbs laser light.

44. The integrated optical connection module of claim 40 wherein said second layer acts as a solder dam.

45. The integrated optical connection module of claim 40 wherein said second layer is selected from the group of Ni, Cr, Ti and CrO.

46. The integrated optical connection module of claim 41 wherein said third layer is made of Ti.

47. The integrated optical connection module of claim 41 further comprising a fourth layer located between said second and third layers.

48. The integrated optical connection module of claim 47 wherein said fourth layer is made of Pt.

49. The integrated optical connection module of claim 37 wherein said thermally insulating material is selected from the group of glass and ceramic.

50. The integrated optical connection module of claim 37 wherein said solder is selected from the group of AuSn, PbSn, and AuGe.

51. The integrated optical connection module of claim 37 wherein said thermally insulating material is attached to said substrate using anodic bonding.

52. The integrated optical connection module of claim 51 wherein at least one lateral gap that is formed between said substrate and said thermally insulating material is filled with glass frit.

53. The integrated optical connection module of claim 52 wherein said glass frit is annealed and polished.

Sub A2

54. The integrated optical connection module of claim 37 wherein said thermally insulating material is formed using flame hydrolysis.

Sub A2

55. A method of fabricating an integrated optical connection module, comprising:

providing a substrate;

patterning and etching a first region of said substrate;

anodic bonding a thermally insulating material in said first region of said substrate;

polishing said thermally insulating material and said substrate to provide a planar surface including a substrate portion and a thermally insulating portion;

attaching a fiber bonding pad including at least one metallic layer to said thermally insulating portion;

locating a first laser on said substrate portion; and

aligning and attaching an optical component to said fiber bonding pad.

56. The method of claim 55 wherein at least one lateral gap is formed between said substrate and said thermally insulating material.

57. The method of claim 58 further comprising filling said lateral gap with glass frit.

58. The method of claim 60 further comprising annealing said substrate, said thermally insulating material and said glass frit.

Sub A2

59. The method of claim 58 further comprising polishing a top surface of said substrate, said thermally insulating material and said glass frit.

60. The method of claim 55 wherein said optical component is selected from the group of active and passive optical components.

61. The method of claim 55 wherein said optical component is an optical fiber.

62. The method of claim 55 wherein said optical component is attached to said fiber bonding pad using solder that is heated using a laser.

Sub A2

63. A method of fabricating an integrated optical connection module, comprising:

providing a substrate;

patterning and etching a first region of said substrate;

forming a thermally insulating material using flame hydrolysis in said first region;

polishing said thermally insulating material and said substrate to provide a planar surface including a substrate portion and a thermally insulating portion;

attaching a fiber bonding pad to said thermally insulating portion;

locating a first laser on said substrate portion; and

attaching an optical component to said fiber bonding pad.

64. The method of claim 63 wherein said flame hydrolysis step is repeated a plurality of times prior to said polishing step.

65. The method of claim 63 wherein said optical component is selected from the group of active and passive optical components.

66. The method of claim 63 wherein said optical component is an optical fiber.

Sub A2

67. The method of claim 63 wherein said optical component is attached to said fiber bonding pad using solder that is heated using a laser.